Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad - 500107

Seminar

Low energy excitation and time-resolved dynamics in heavy-fermion systems

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Quantum phase transitions (QPT) describe a change between two ground states of a many-body system, controlled by a nonthermal control parameter [1]. Rare-earth heavy-fermion systems show a QPT between a fully Kondo-screened, paramagnetic Fermi-liquid phase and an antiferromagnetically ordered phase. When excited by a terahertz pulse, the heavy quasiparticles disintegrate and coherently recover on a picosecond timescale, characteristic of the Kondo coherence time or inverse Kondo temperature [2].

In my talk, I will demonstrate how terahertz time-domain spectroscopy can be used to probe the Kondo quasiparticle spectral weight at such ultrafast timescales. Further, I will elaborate on how we could distinguish contributions from the heavy Kondo band and from the crystal-electric- field (CEF) split satellite bands [3]. We corroborate our observations by temperature-dependent, high-resolution dynamical mean-field calculations for the multi-orbital Anderson lattice model and discuss its relevance for quantum critical scenarios.

References:

[1] H. V. Lohneysen et al., Rev. Mod. Phys. 79, 1015 (2007).
[2] C. Wetli, S. Pal et al., Nat. Phys. 14, 1103 (2018).
[3] S. Pal et al., Phys. Rev. Lett. 122, 096401 (2019).

Wednesday, Oct 9th 2019

4:00 PM (Tea/Coffee at 3:30 PM)

Seminar Hall, TIFR-H